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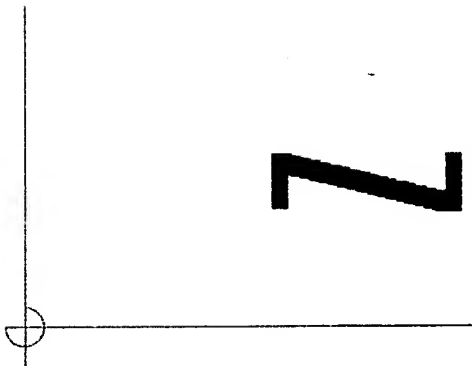
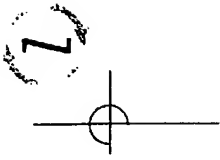
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z e t e r a

January 2003

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No. 10
363381



The Ground Floor Z-Team

- Chuck Cortright – President & CEO
- Bill Frank, CTO
- Tom Ludwig, VP, Engineering
- Tom Hanan, Chief System Architect
- Bill Babbitt, Chief Software Engineer

The Z-Team Staff

- Seasoned veterans of the storage & computer industries
- Members of the technical team invented the two most significant standards for storage in PCs: IDE and ATAPl.
- Members of the team have made many key contributions to new, emerging standards such as IEEE 1394, SBP-2 and Serial ATA and multiprocessor bus architecture.
- The strong architectural competency held within the team is now being applied to develop the μ SAN technology.

μSAN - The Next IDE

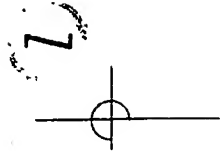
- Over 15 years ago the IDE interface was invented and adopted for the PC industry
- Still today's primary low-cost, high-volume storage interface
- Now, over 15 years later the same inventors have developed the μSAN™ technology/protocol to bring low-cost, high-volume storage to the network.

Abbreviation of either *Intelligent Drive Electronics* or *Integrated Drive Electronics*, depending on who you ask. An IDE interface is an interface for mass storage devices, in which the controller is integrated into the disk or CD-ROM drive.

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Today's Agenda

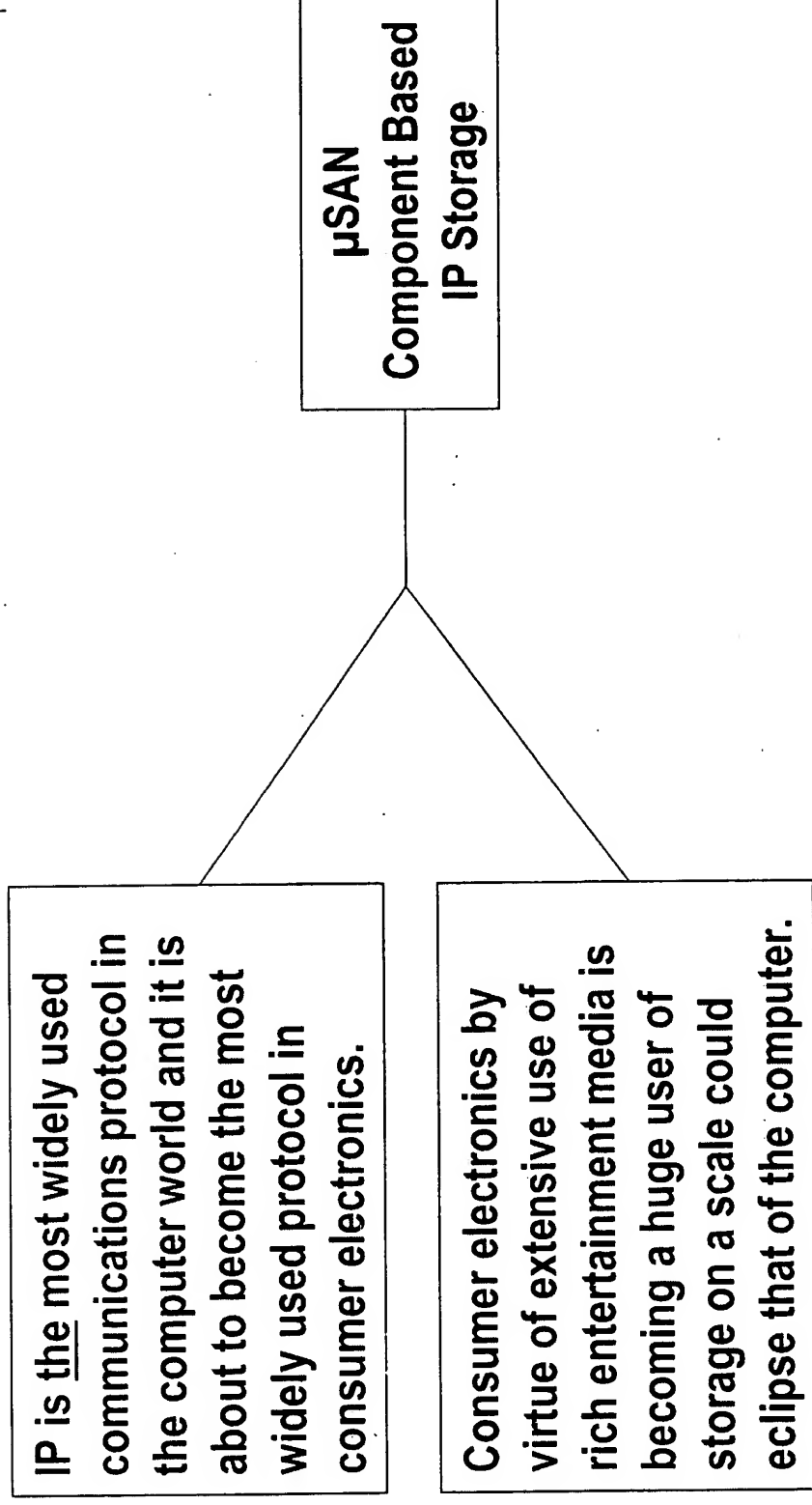
- What is the Zetara Technology
- Technical Overview
- Demonstration
- Q&A



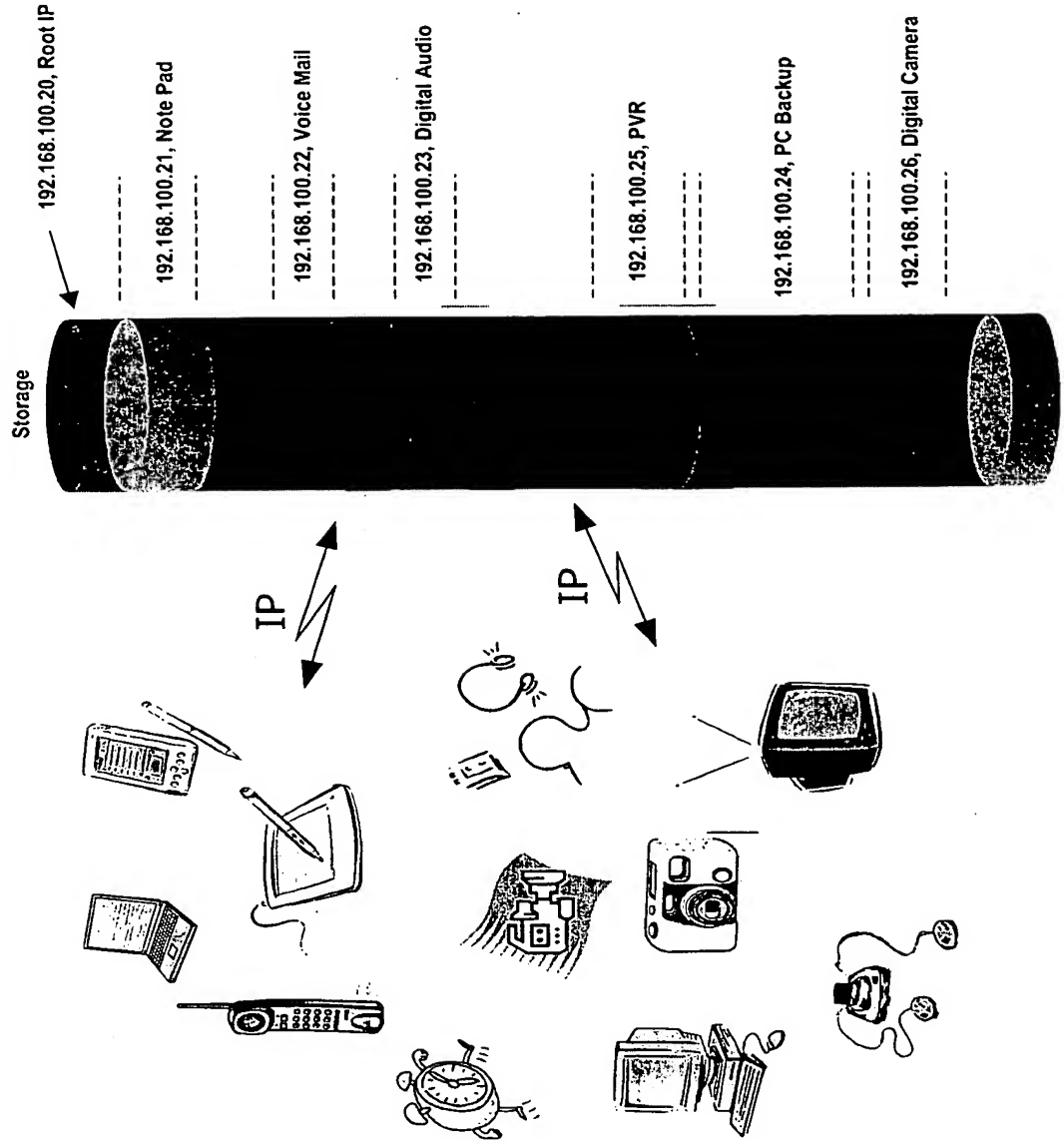
Storage - Perceived Problems

- The emergence of new low-cost sensitive consumer electronics appliances can benefit from the mass storage offered by hard-drive storage and yet they cannot afford the component cost of a dedicated hard-drive.
- There is a need for simple expandable storage in the home/SOHO environment that is not constrained by a complicated client/server protocol, that attaches to the home/SOHO network seamlessly and may be shared equitably.

What Drives the Need for μ SAN ?

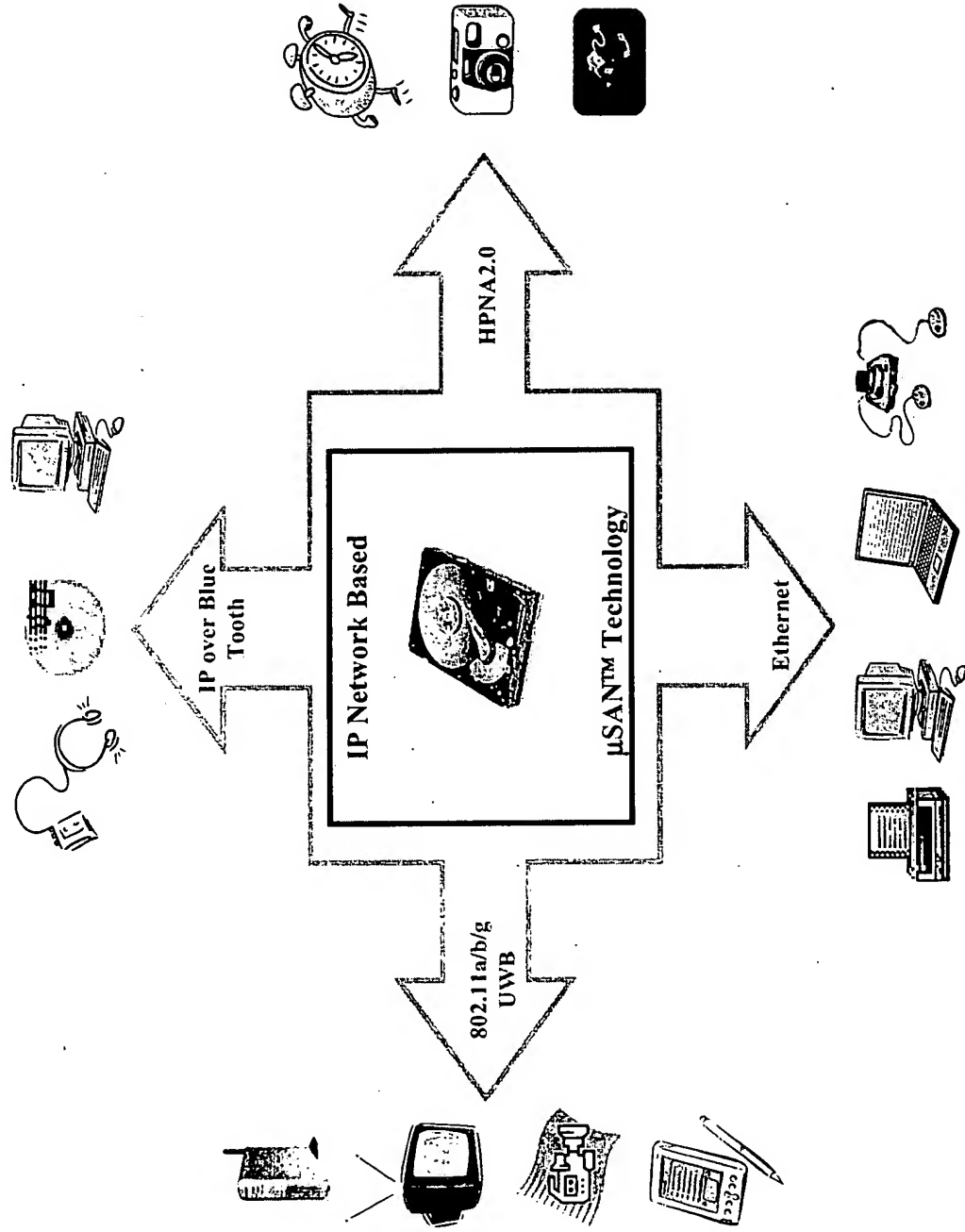


µSAN Partition Allocation



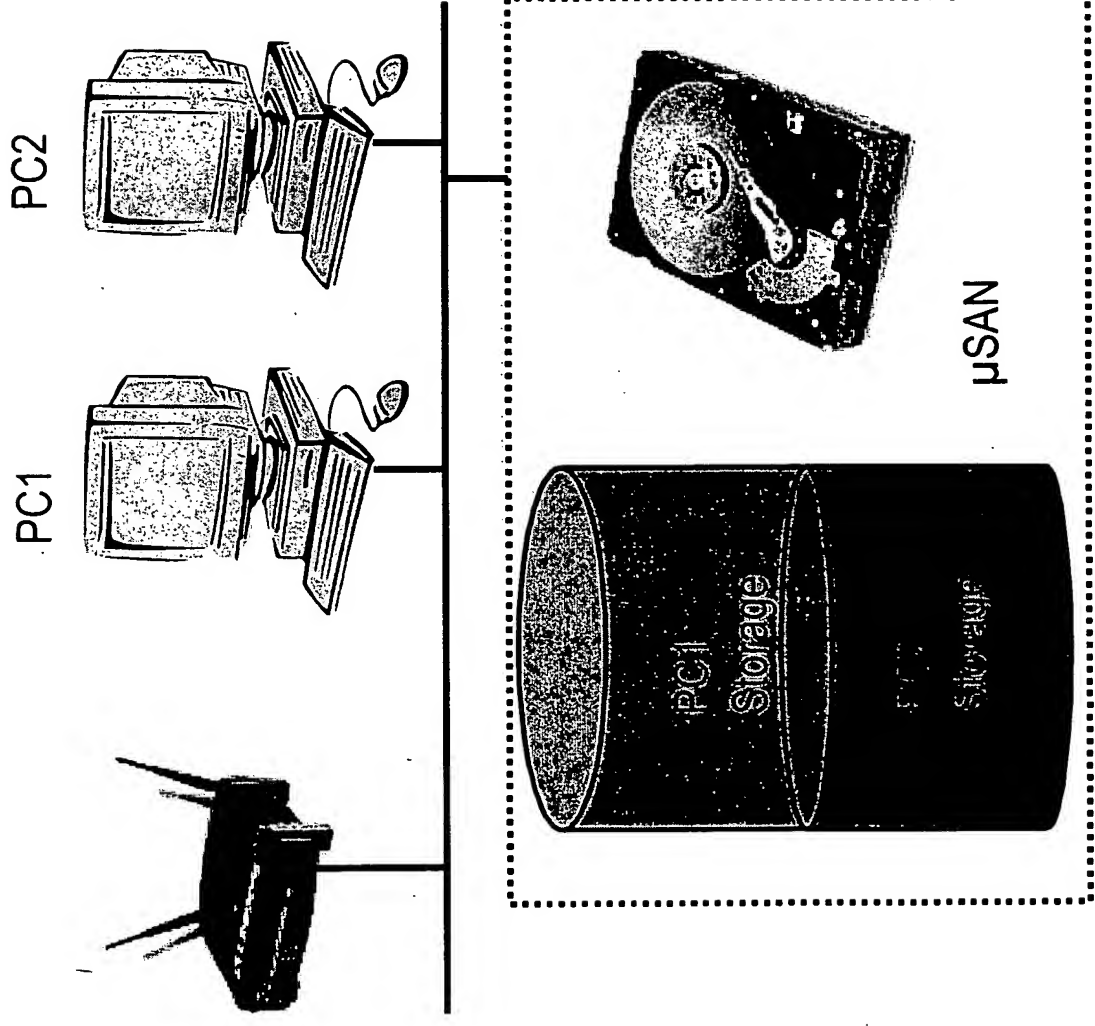
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μSAN Technology - Interoperability



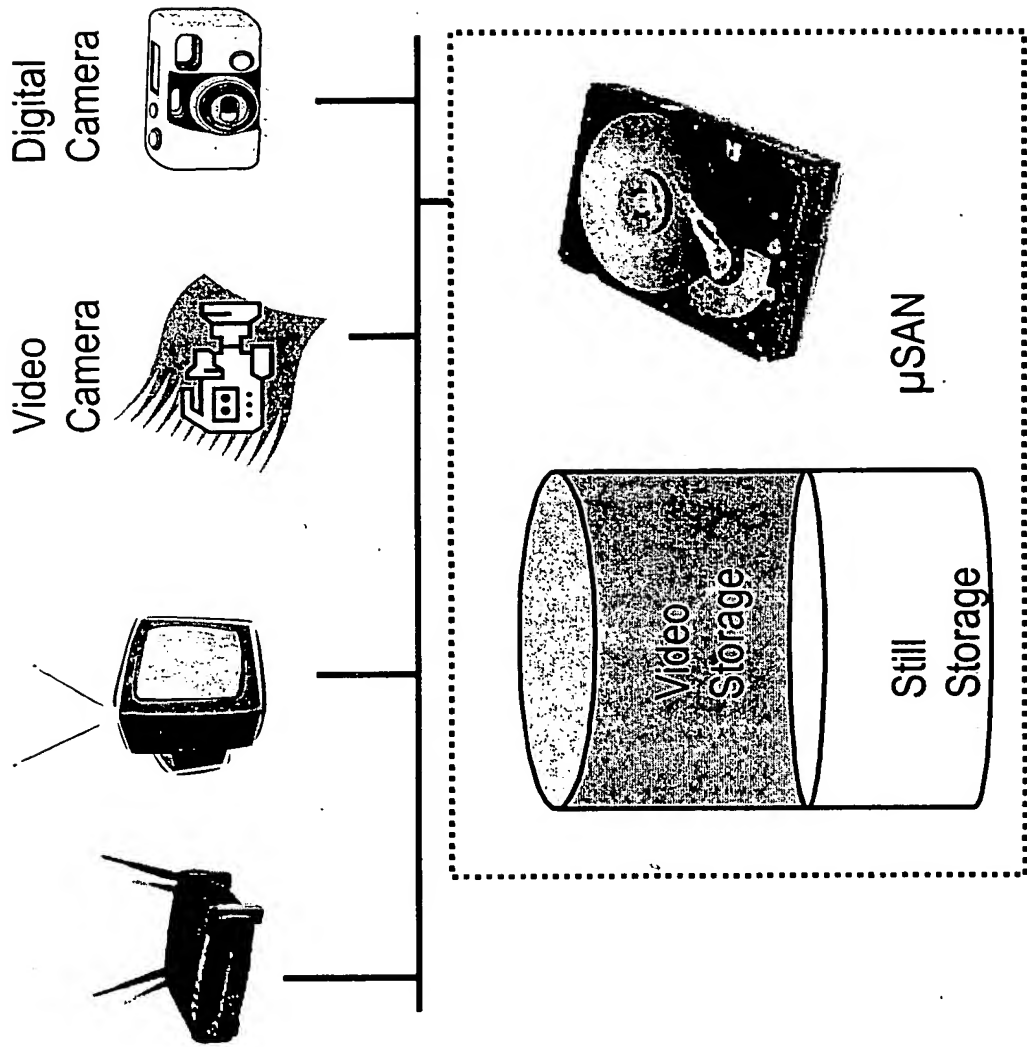
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PC Storage Solution



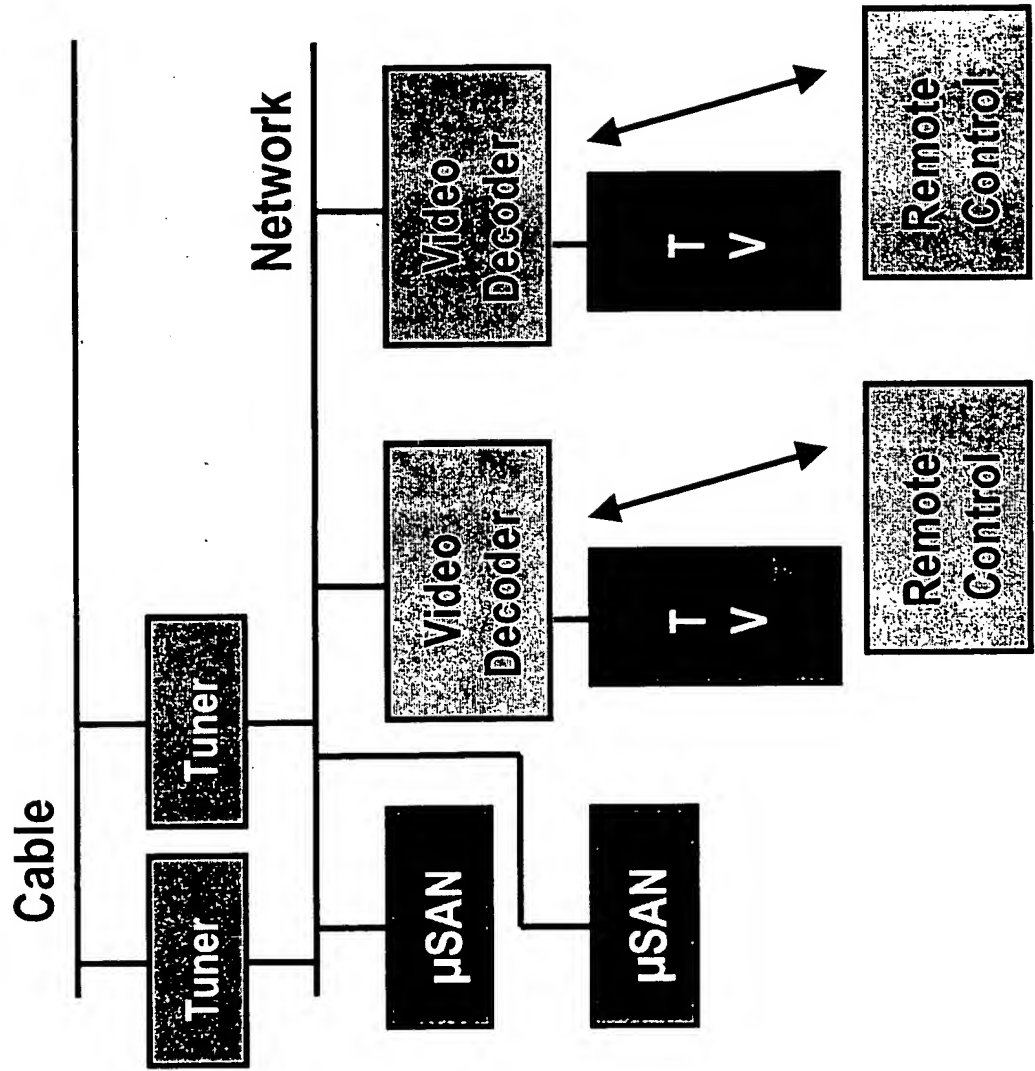
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Digital Camera Solution



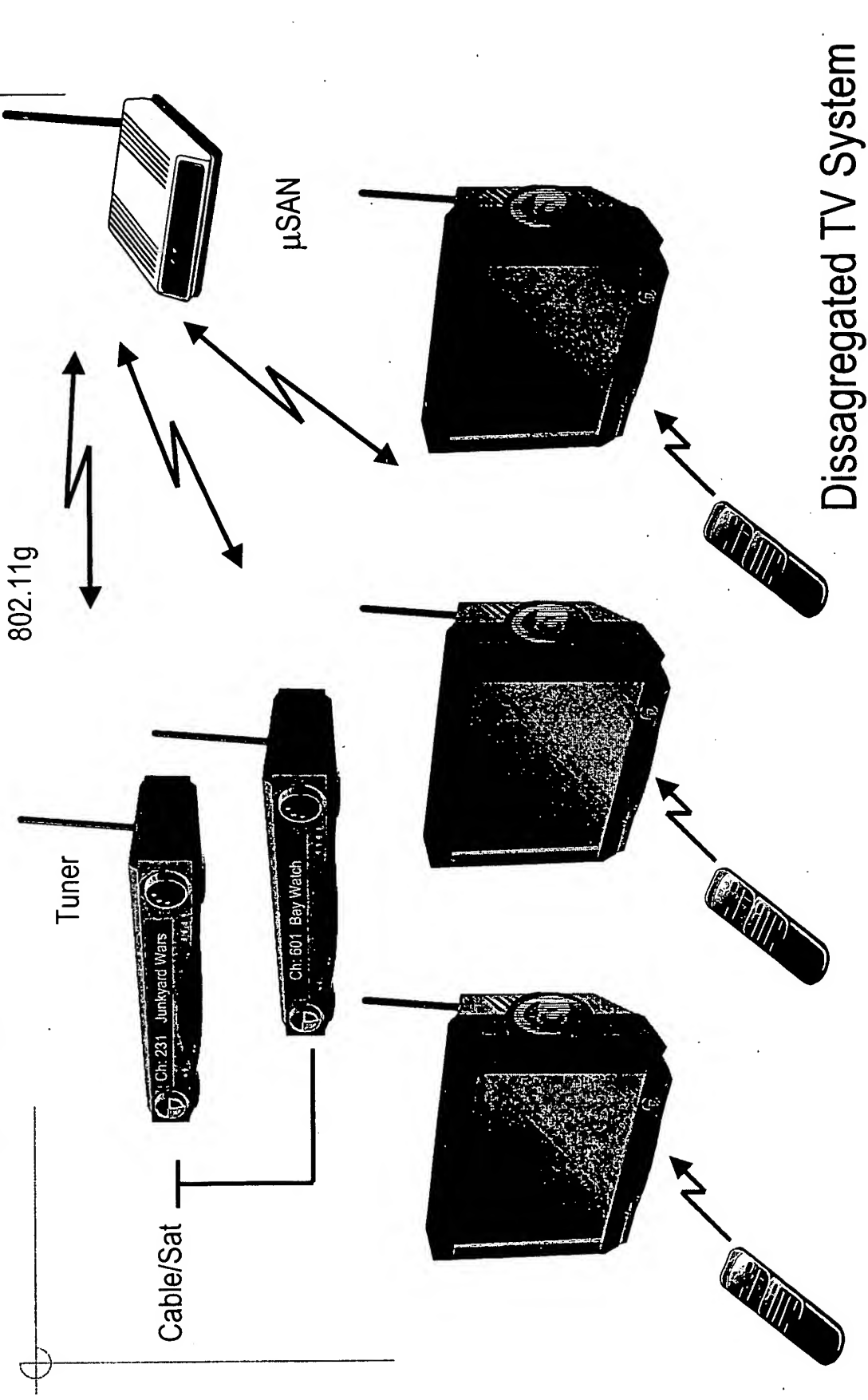
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PVR/STB Solution



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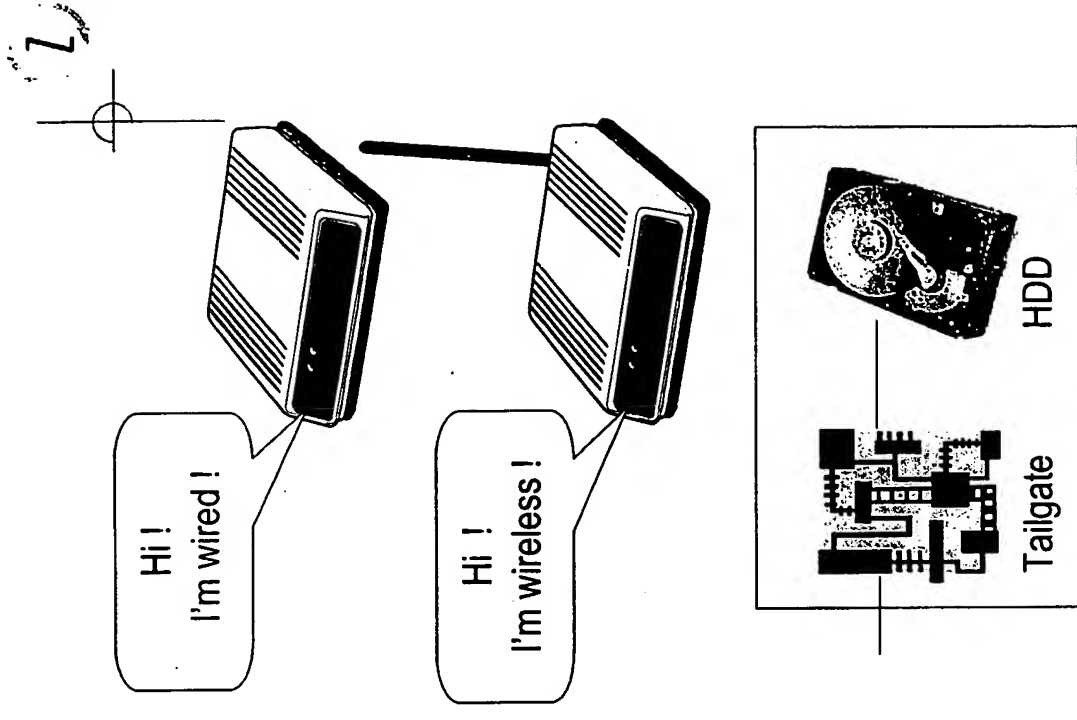
Dissagregation - Real life examples



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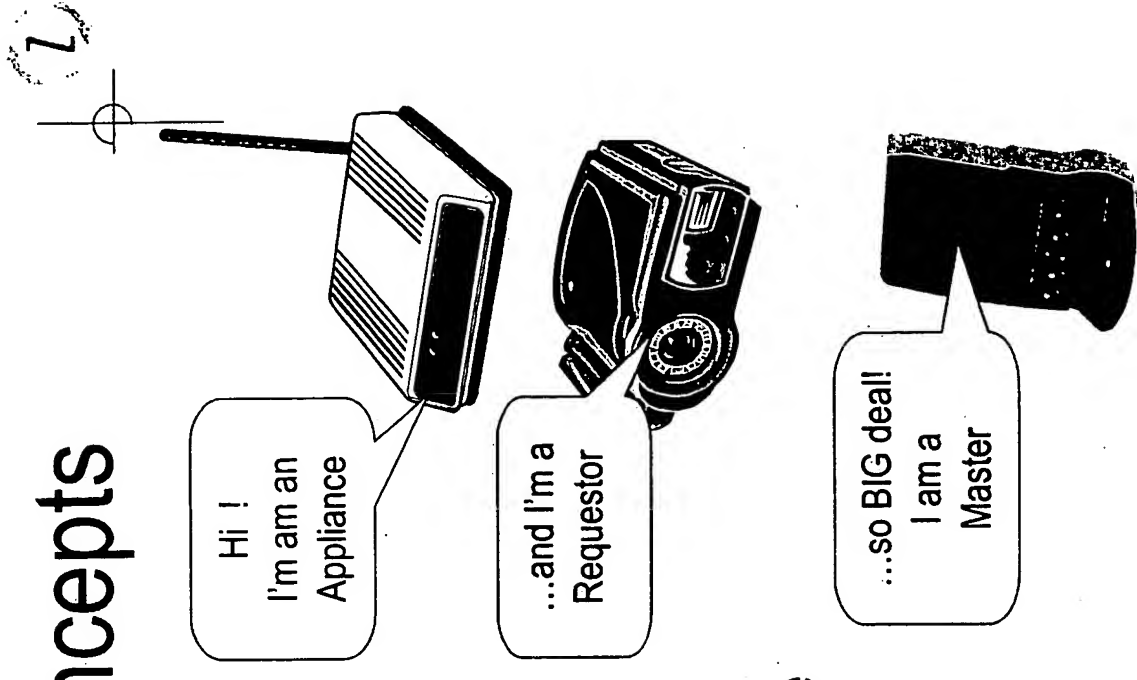
What is a μ SAN ?

- A μ SAN consists of a Storage Device, most likely an EIDE HDD, and a protocol adapter known as a "Tailgate" housed within a suitable enclosure
- The Tailgate adapter is very similar to existing 1394/USB adapters in complexity and cost
- The Tailgate provides the appropriate PHY and protocol level interface either wired or wireless determined by the needs of the product.



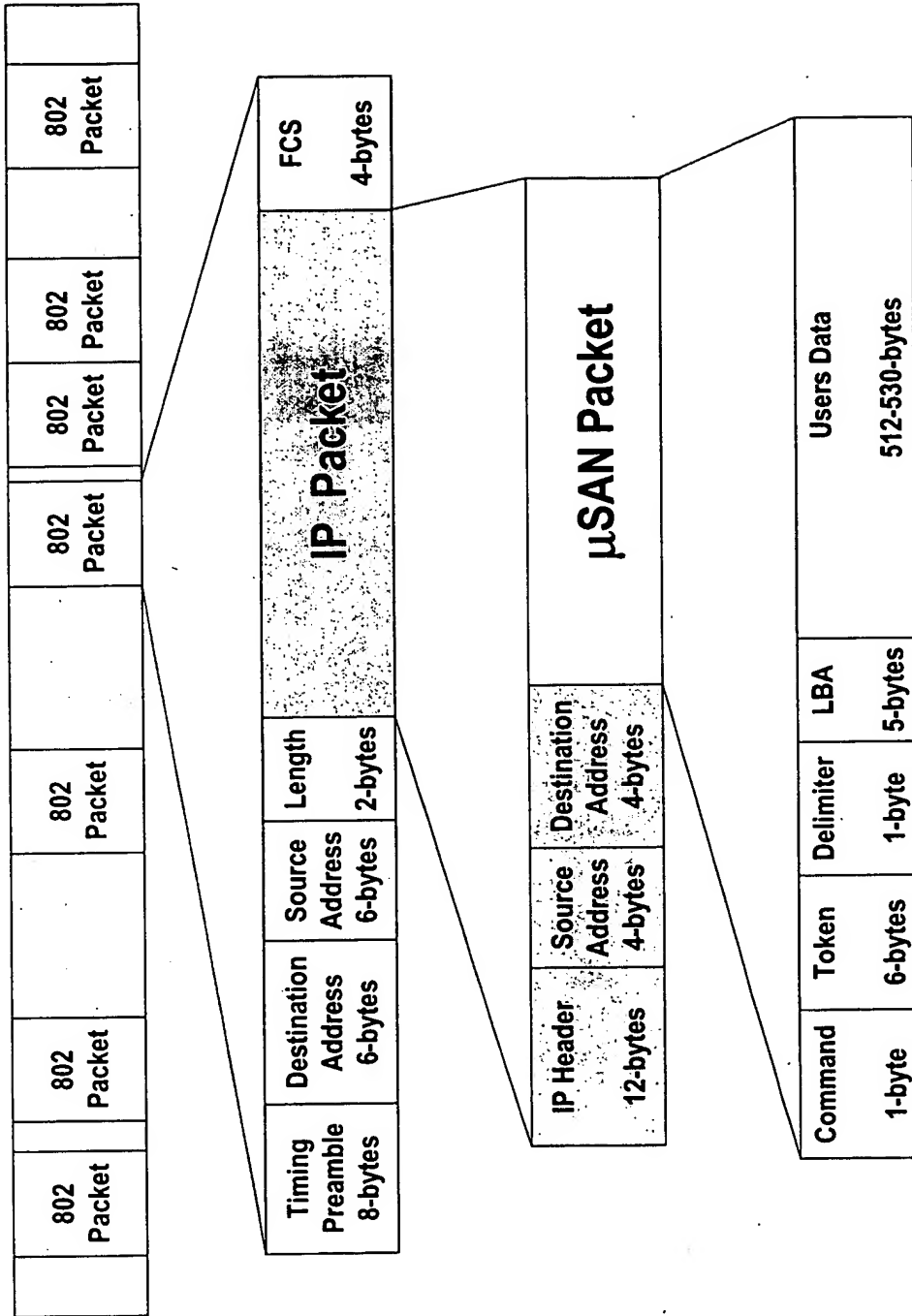
μSAN - Some Basic Concepts

- A μSAN lives in an IP network
 - Ethernet
 - WiFi
 - HomePlug
 - HPnA
 - Any form of IP works
- A μSAN is a Peer on a network of Peers
- A μSAN is not a server – it's an appliance
- A μSAN can work under a master
- A μSAN user is not really a Client
- A μSAN user can be called a Requestor



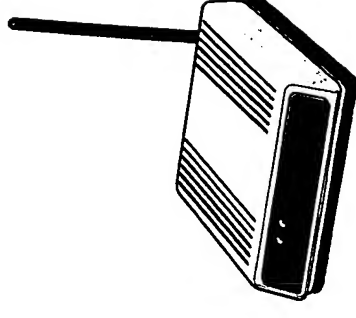
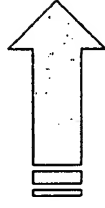
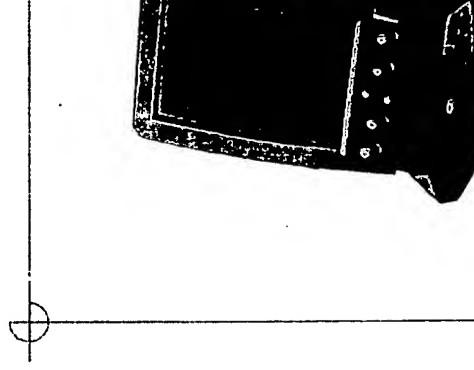
Embedding the μ SAN protocol inside IP

Ethernet Stream



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Discovering a networked μ SAN device

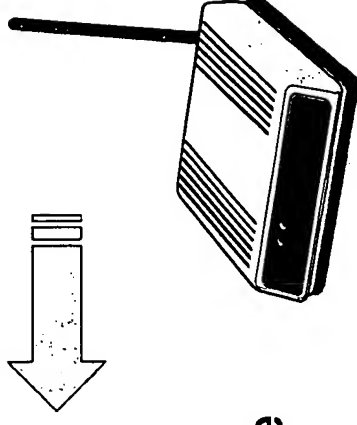
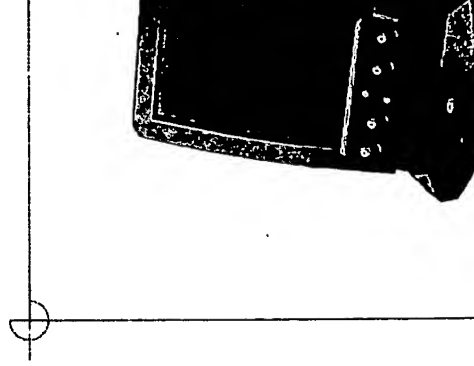


Send Find μ SAN Broadcast
Command = 80h

I'm Looking for a μ SAN

I'm Looking for a μ SAN

Discovering a networked μ SAN device

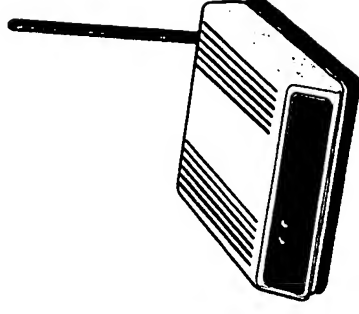
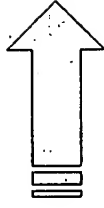
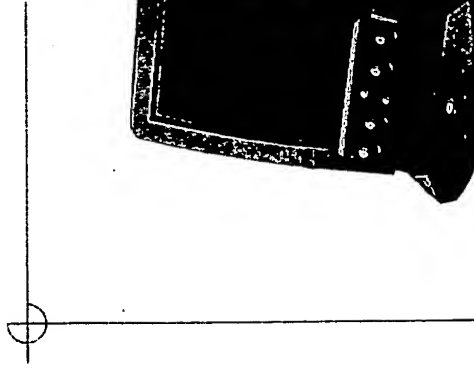


Send μ SAN Find Response
Command = 81h
IP Addr = 192.29.100.0

μ SAN 192.29.100.0

I Hear you
I'm here

Owning a μ SAN storage volume

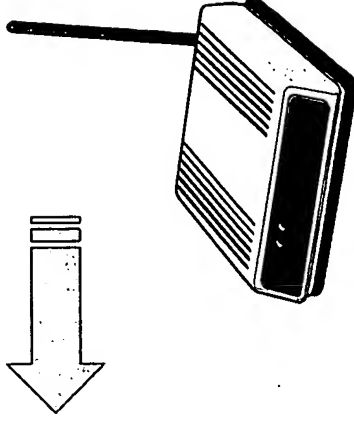
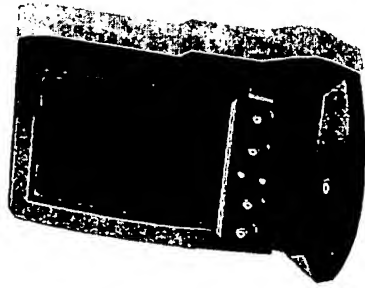


Get μ SAN Root Status
(Request Transfer Command)
LBA = 0
Token = (don't care)

μ SAN 192.29.100.0

How much Free Space
is available ?

Owning a μ SAN storage volume

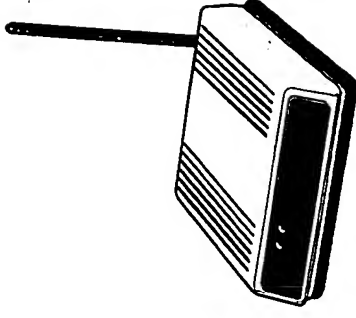
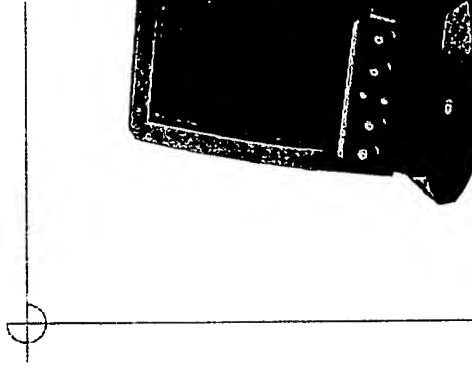


- a. Version
- b. Total Capacity
- c. Available Capacity
- d. Speed
- e. Reliability
- f. Portability
- g. QoS Capability
- h. ...

μ SAN 192.29.100.0

I have lots of space
Here's my root status

Owning a μ SAN storage volume



**Allocate a Partition
(Block Transfer Command)**

LBA = 0

Token = (don't care)

Data bytes 0 – 511

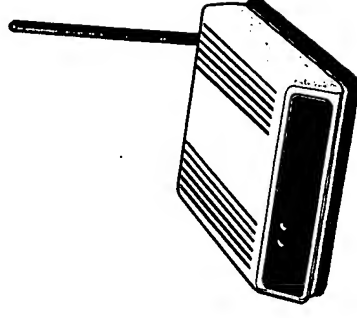
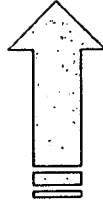
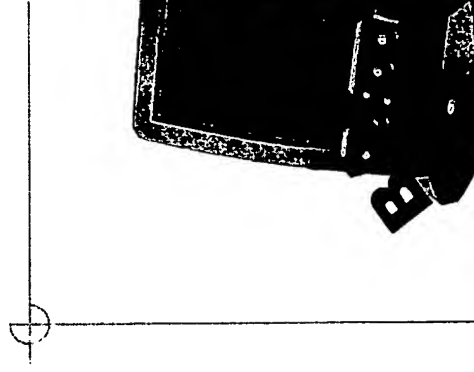
μ SAN 192.29.100.0

OK!

Reserve a partition

- a. Partition Name = PDA
- b. Partition Token= PDA's token
- c. ID Character String
- d. Authentication Tags
- e. Partition Size
- f. Personality Tags

Security and authentication



Hey PDA Partition!

I Want to erase data.

(chuckle)

Write Data Block

(Block Transfer Cmd)

Requestor IP = Wrong

Requestor MAC = Wrong

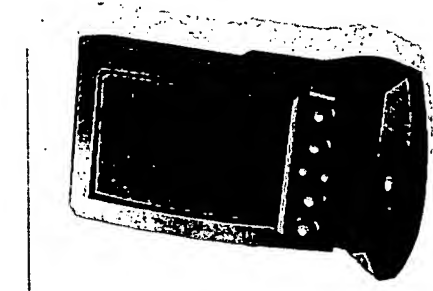
LBA DAC = Wrong

Payload DAC = Bogus

Not even close!

No Response

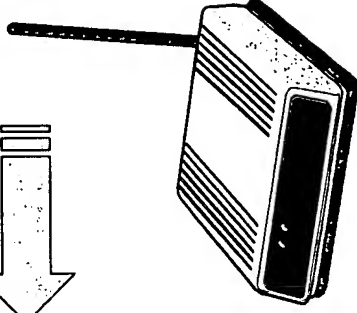
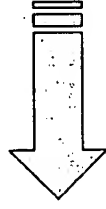
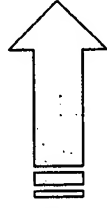
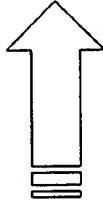
Spanning Partitions with Multicast



My data will not
fit on one μ SAN

2 M Blocks!

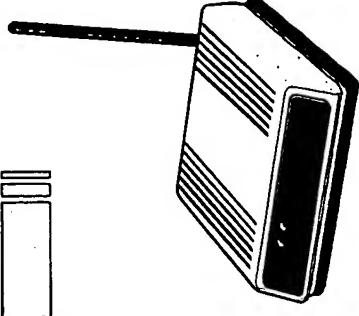
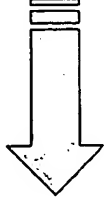
I'll use Multicast



Writing blocks

1 – 1 M

These blocks are
mine so I will write
them and ACK

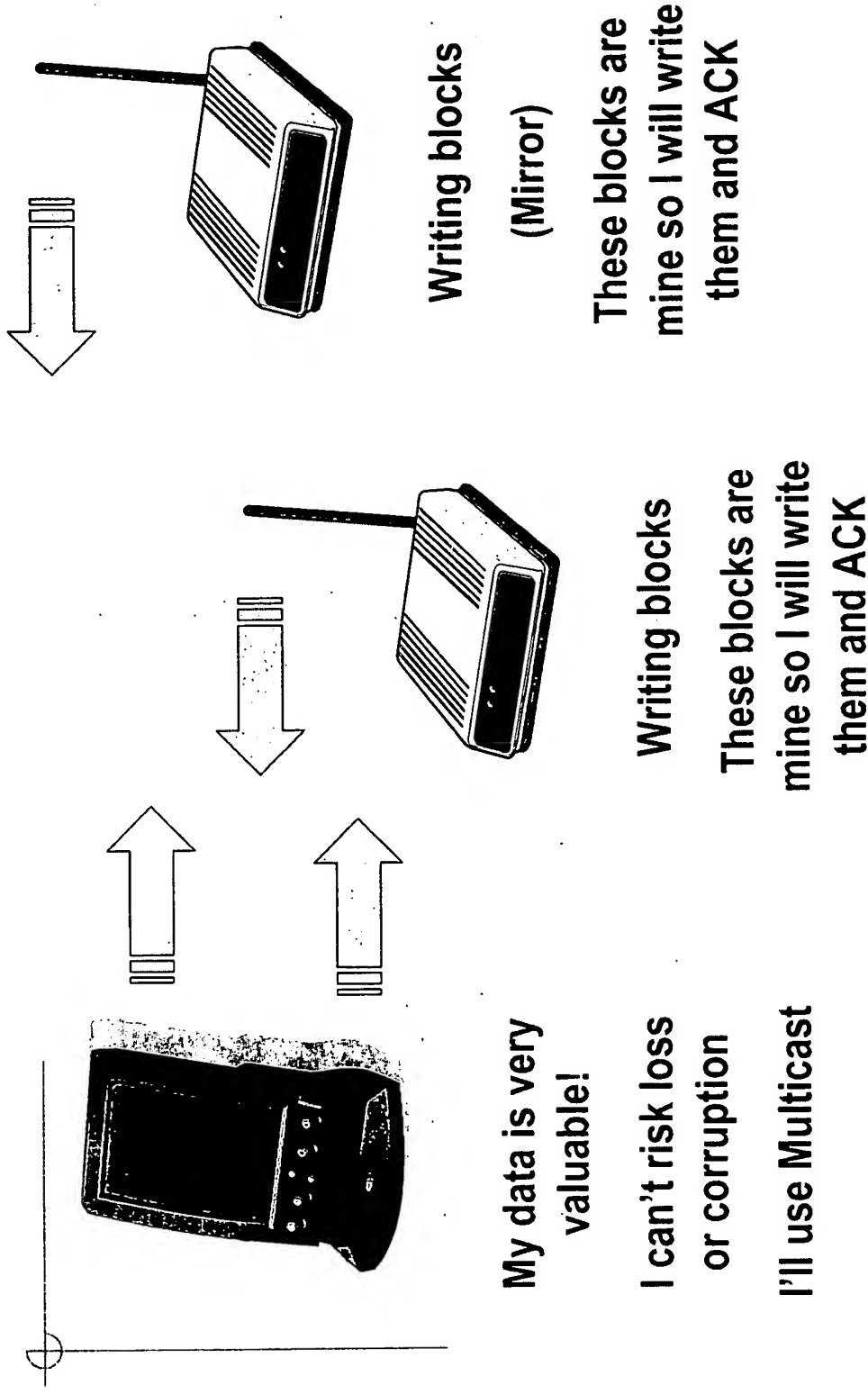


Writing blocks

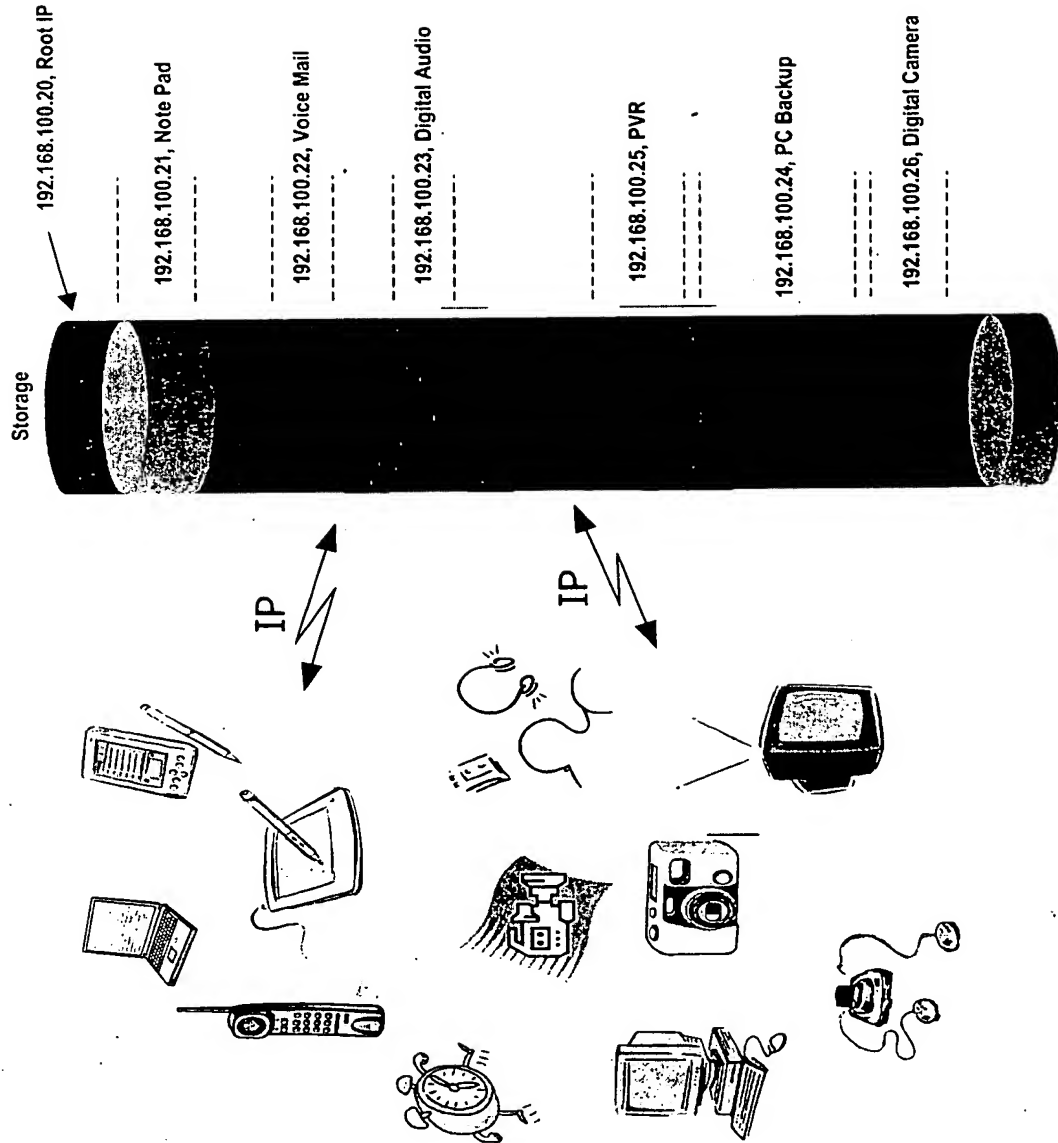
1 M +1 – 2M

These blocks are
mine so I will write
them and ACK

Redundant Partitions with Multicast



μSAN Partition Allocation



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